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PINE BUTTERFLY[1] POPULATIONS ON THE BOISE AND PAYETTE NATIONAL FORESTS 1985

by

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ABSTRACT

In 1985 ponderosa pine defoliation was not detected during aerial detection surveys. Population evaluations indicate the pine butterfly outbreak has collapsed.

INTRODUCTION

The most recent pine butterfly infestation in southern Idaho began in 1981 when ponderosa pines in a small 500 to 600 acre area south of Dry Buck Summit on the Boise National Forest were defoliated. Population evaluations in 1981 indicated populations were expanding and further defoliation was anticipated (Thier 1982).

In 1982, aerial surveys revealed that ponderosa pine on about 5,800 acres was moderately to severely defoliated at two separate areas on and around the Boise National Forest. Defoliation became more extensive around Dry Buck Summit, and a second area of defoliation was noted around Arling Hot Spring. The 1982 population evaluation indicated an expanding population

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around Arling Hot Spring but natural controls were causing a population decline around Dry Buck Summit (Thier 1983).

Aerial surveys in 1983 elevated pine butterfly to a major concern. Ponderosa pine on 16,280 acres on and around the Boise National Forest was defoliated. Population evaluations conducted in 1983 showed population shifts. Populations continued to decline at Dry Buck Summit; population decline began at Arling Hot Spring; and populations increased at Crown Point around Cascade, Idaho (Thier et al. 1984).

In 1984 ponderosa pine defoliation declined to 2,800 acres along with a general population decline. Collapse of the outbreak was predicted (Mocettini and Thier 1985).

In this evaluation I conclude the report on the current outbreak.

METHODS

Population Status

Detection--As part of the annual regional insect surveillance program, aerial surveys were conducted during the summer of 1985 to monitor and record pine butterfly defoliation.

Population Evaluation--To evaluate the 1985 population status, I employed the egg sampling techniques outlined by Bousfield and Dewey (1972). Six five-inch apical twigs were collected at midcrown from each of ten trees at each evaluation site and taken to the laboratory for examination.

Selection of evaluation sites was based on areas sampled previously (Thier et al. 1984) and recommendations in last year's assessment (Mocettini and Thier 1985). A total of eight sites on the Boise and Payette National Forests were sampled. General location of these sites is found in Thier et al. (1984).

In the laboratory foliage was examined for pine butterfly eggs. Eggs were counted, categorized as viable or nonviable, and the average number of viable eggs per twig computed. Values were then compared with previous evaluations (Thier 1982, 1983, Thier et al. 1984, Mocettini and Thier 1985) to determine relative change in size of pine butterfly populations.

Predation--During laboratory evaluations nonviable eggs, assumed to result from predation, were also counted. Distinction between viable and nonviable eggs was based on color. If egg color was other than the normal light green, it was considered to have been affected by predators (Bousfield and Dewey 1972). I used these values to compute the mean number of eggs per twig destroyed by predation and the percent egg predation. These values indicate the degree of natural predation upon the egg stage of the pine butterfly population.

Predicted Defoliation

To predict 1986 defoliation levels, I used the methods developed by Bousfield and Dewey (1972). When twig samples were gathered at each

evaluation site, the percentage of trees with defoliation was determined. This was based on the observed defoliation of 20 host trees around each site. Using this defoliation information and viable egg averages computed earlier, the following equation was used to generate defoliation indices for 1986:

$$Y = -0.0659 + 0.0141 (X\ 1) + 0.02 (X\ 2), \text{ where}$$

Y = predicted defoliation index

X 1 = mean number of viable eggs/five-inch twig

X 2 = percentage of trees with current defoliation

So that the defoliation index (Y) is useful in quantifying predicted defoliation, it is converted to predicted percent defoliation and then, for ease of discussion, to defoliation category by interpolation in the following table:

Defoliation Index	Predicted Defoliation (%)	Predicted Defoliation Category
0	0	Negligible
1	25	Light
2	50	Moderate
3	75	Heavy
4	100	Severe

Finally I compared 1985 and 1986 calculated defoliation indices to follow defoliation index trends.

RESULTS AND DISCUSSION

Population Status

Detection--For the first time since 1981 ponderosa pine defoliation was not recorded during aerial detection surveys. This is in contrast to 16,280 acres of ponderosa pine defoliation seen in 1983 at the height of the outbreak and to 2,800 acres in 1984.

Population Evaluation--Eggs were found on foliage from all collection sites on the Boise National Forest, but many were nonviable. The highest viable egg count, averaging 0.48 per 5 inch twig, was from the evaluation site at Little Pearsol Creek on the Boise National Forest (Table 1). No pine butterfly eggs were collected at Anderson Creek on the Payette National Forest.

I determined the relative change in the size of the resident pine butterfly populations at evaluation sites sampled in previous years by comparing the mean number of viable eggs in 1985 with previous year's data (Mocettini and Thier 1985). Decreases in egg deposition occurred at all evaluation sites. Low viable egg counts for the 1985 evaluation sites indicate collapse of the outbreak.

Predation--Evaluation sites are ranked in Table 2 according to degree of egg predation. Some predation occurred at 6 of the 8 evaluation sites and ranged from 100 percent at several sites to zero at Dry Buck Summit #1 and Anderson Creek.

Predicted Defoliation

As predicted for 1985, negligible defoliation is predicted for 1986 (Table 3). The trend of defoliation indices is static to declining--indicating a further reduction in pine butterfly activity.

Table 1. Mean number of viable pine butterfly eggs per five-inch twig - 1981, 1982, 1983, 1984, 1985.

	Mean No. Viable Eggs/Five-Inch Twig				
Evaluation Site	1981	1982	1983	1984	1985
Boise N.F.					
Dry Buck Summit #1	33.67	10.52	0.31	1.22	0.27
Dry Buck Summit #2	N.S.[1]	13.40	0.58	0.77	0.12
Grandjean Junction	N.S.	N.S.	10.65	0.60	0
Lick Creek	0.10	2.30	7.30	0.30	0
Little Pearsol Creek	0.40	4.37	20.58	0.93	0.48
Pearsol Creek	2.35	19.73	16.47	0.10	0
State Plot #16	N.S.	N.S.	29.98	0.35	0
Payette N.F.					
Anderson Creek	N.S.	6.83	1.23	N.S.	0

[1] N.S. - not sampled

Table 2. Pine butterfly egg predation on the Boise and Payette National Forests - 1985.

Evaluation Site	Mean Number of Eggs/Five-Inch Twig		
	Total Eggs	Destroyed by Predation	Percent Egg Predation
Boise N.F.			
Pearsol Creek	0.32	0.32	100
Lick Creek	0.13	0.13	100
State Plot #16	0.97	0.97	100
Grandjean Junction	0.18	0.18	100
Dry Buck Summit #2	0.27	0.15	56
Little Pearsol Creek	1.05	0.57	54
Dry Buck Summit #1	0.27	0	0
Payette N.F.			
Anderson Creek	0	0	0

Table 3. Potential defoliation by pine butterfly on the Boise and Payette National Forests in 1986.

Evaluation Site	1985 Predicted Defoliation Index	1986 Predicted Defoliation Index	1986 Predicted Percent Defoliation	1986 Defoliation Category	Defoliation Index Trend[1]
Boise N.F.					
Dry Buck Summit #1	0.1	0.0	0	Negligible	0
Dry Buck Summit #2	0.1	0.0	0	Negligible	0
Grandjean Junction	0.1	0.0	0	Negligible	0
Lick Creek	0.3	0.0	0	Negligible	0
Little Pearsol Creek	0.1	0.2	5	Negligible	0
Pearsol Creek	1.1	0.0	0	Negligible	-
State Plot #16	0.4	0.0	0	Negligible	0
Payette N.F.					
Anderson Creek	N.S.[2]	0.0	0	Negligible	0

[1]Trend: 0 static, - decreasing. Established from comparison of 1985, 1986 defoliation indices.

[2]N.S. - not sampled

CONCLUSION

This 1985 evaluation confirms the population collapse prediction based on 1984 evaluation data (Mocettini and Thier 1985). With the return of pine butterfly populations to endemic levels, further evaluations are unnecessary until outbreak conditions are reported.

This pine butterfly outbreak declined naturally after about four years of defoliation. Since pine butterfly is a native insect, similar outbreaks will undoubtedly occur in the future and probably cycle naturally as this one.

The effects of this outbreak are being monitored. Permanent observation sites were established in 1983 (Thier 1985). Tree and stand measurements will be recorded periodically in the future to determine effects of defoliation on host trees.

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